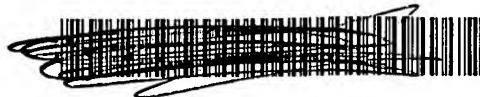




(19) Europäisches Patentamt  
European Patent Office  
Office européen des brevets



(11)

EP 1 219 262 A1

(12)

## EUROPEAN PATENT APPLICATION

(43) Date of publication:  
03.07.2002 Bulletin 2002/27

(51) Int Cl.7: A61C 5/06

(21) Application number: 01100219.3

(22) Date of filing: 02.01.2001

(84) Designated Contracting States:  
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU  
MC NL PT SE TR  
Designated Extension States:  
AL LT LV MK RO SI

(71) Applicant: GC Corporation  
Itabashi-ku, Tokyo (JP)

(72) Inventors:  
• Mukasa, Yoshihisa, c/o GC Corporation  
Tokyo (JP)

• Suzuki, Yoshimasa, c/o GC Corporation  
Tokyo (JP)  
• Aoyagi, Shuji, c/o GC Corporation  
Tokyo (JP)

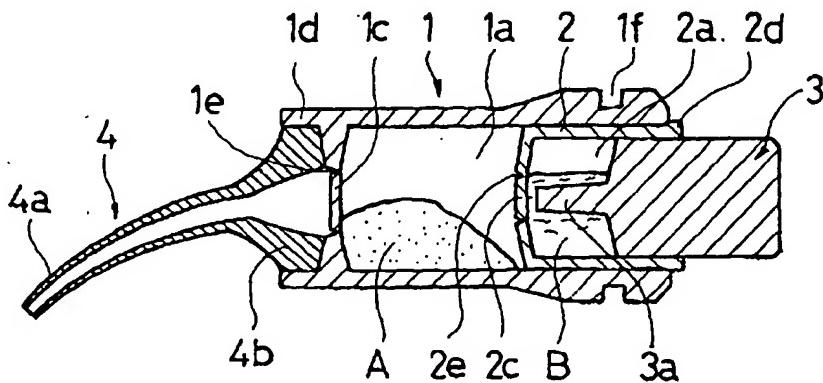
(74) Representative: Becker Kurig Straus  
Patentanwälte  
Bavariastrasse 7  
80336 München (DE)

### (54) Capsule for dental restoration material

(57) A capsule for dental restoration material for applying directly to a tooth site to be restored of a patient including a mixed material prepared therein from a powder component and a liquid component is disclosed, comprising a cylindrical capsule main body (1) having a mixing compartment for a powder component (A) and being provided with a first aperture forming portion (1c) to form an outlet hole (1b) on a center axis in a tip portion (1d) thereof; a liquid cup (2) having a liquid component accommodation compartment (2a) for a liquid component (B) being provided with a second aperture forming portion (2c) to form an outlet hole (2b) for the liquid component (B) on a center axis in a tip portion thereof, being engaged with a cylindrical portion to form the mixing

compartment (1a), and being provided on an external surface near a rear end portion thereof with a convex stopper having a size so as to inhibit the liquid cup to readily slide into the capsule main body (1) during breaking through the second aperture forming portion (2c) but not inhibit the liquid cup to slide into the capsule main body (1) when a large force is applied; a plunger (3) having a rod-like projection (3a) for breaking through the second and first aperture forming portions (2c, 1c) and being engaged with a cylindrical portion within the liquid cup (2); and a nozzle (4) whose rear end portion (4b) has a shape corresponding to the tip portion (1d) of the capsule main body (1) to be connected to the tip portion of the capsule main body (1).

【Fig. 1】



EP 1 219 262 A1

**Description****BACKGROUND OF THE INVENTION****Field of the Invention:**

[0001] The present invention relates to a capsule for dental restoration material, which can be applied to a site to be restored of a tooth, immediately after mixing a dental restoration material comprising two components of a powder component and a liquid component, in filling, cementing, lining and other applications for restoration of the teeth in the dental remedy field.

**Description of the Conventional Art:**

[0002] In general, a dental restoration material is used for restoration of the teeth. As the dental restoration material, a two-component system material comprising a powder component and a liquid component, which are reacted with each other upon mixing, is usually used. Hitherto, this two-component system material was provided for use after appropriately weighing the powder component and the liquid component every time and mixing them with each other. However, in recent years, for the purposes of omitting a weighing operation of the powder component and the liquid component and an operation for accommodating the dental restoration material after mixing into a syringe for applying it to a site to be restored, there have been developed capsules for dental restoration material, in which certain amounts of the powder component and the liquid component are previously weighed and accommodated in an isolated state from each other, the isolated state is released at a desired time, the both components are mechanically mixed with each other by a mixer or the like, and the resulting mixed material is extruded and applied directly into a site to be restored, such as a tooth cavity, through a nozzle.

[0003] For example, in a capsule as disclosed in Japanese Patent Publication No. 38853/1991, a powder component of two components is accommodated in a mixing compartment of a container main body, and the other liquid component is charged in a bag, which is assembled in a side portion of the mixing compartment accommodating the powder component by means of a clip. The container main body has an aperture in a tip portion. This aperture can be clogged in a spherical bearing portion in a rear end portion of a distribution nozzle. Further, the distribution nozzle is kept from the outside by means of a separately formed cap, thereby preventing the powder component to leak to the outside of the mixing compartment. And, at the time of use, the clip is pushed down in a direction of the mixing compartment using a separately prepared exclusive tool, thereby smashing and breaking the bag having a liquid component charged therein; the liquid component is discharged into an interior of the mixing compartment

through an aperture provided on a side wall of the mixing compartment, followed by shaking by a mixer, thereby mixing the liquid component and the powder component with each other; the spherical bearing portion in the rear end portion of the distribution nozzle is then rotated to release a passage of the distribution nozzle; and the mixed material is extruded from the distribution nozzle via a separately prepared tool by means of a pushing pressure of a piston.

[0004] In the capsule having the structure described above, as a material of the bag having a liquid component charged therein, a laminate sheet comprising an aluminum foil and a resin film is generally used. For this reason, there are various problems as follows. That is, there is a high risk that in the case where the liquid component is acidic, at the time of use, the liquid component which has flown out by the breakage of the bag dissolves the aluminum foil in an exposed broken section of the bag and mingles into the dental restoration material. Further, there may be a risk that since the bag having a liquid component charged therein is broken by a mechanical pushing pressure, a residual piece of the broken bag section faced at the aperture of the mixing compartment mingles into the mixing compartment. Still further, since the aperture on the wall of the mixing compartment having a powder component accommodated therein is clogged merely by pushing the bag having a liquid component charged therein by the clip, the sealing properties of the mixing compartment is not complete, and an exclusive tool is necessary for breaking the bag. Also, since in the distribution nozzle assembled in the tip side of the mixing compartment, an angle against the container main body is limited to a constant angle in order to ensure a passage of the mixed material, it lacks a degree of freedom, and it is impossible to exchange the distribution nozzle.

[0005] On the other hand, a two-component system capsule for mixing and discharge as disclosed in Japanese Patent Laid-Open No. 268555/1987, in which a powder component of two components is accommodated in a mixing compartment within a container main body, and the other liquid component takes a form (pillow) being wrapped by a sheet film comprising a resin, a metal foil, or a laminate comprising a resin and a metal foil. In this pillow, the strength in the main body side is previously set to be low, and a cap to be screw engaged with the container main body is assembled in the tip side of the container main body. At the time of use, when the cap is strongly screw engaged with the container main body and moved, the sheet in the container main body side of the pillow is broken, and the liquid component is introduced into the mixing compartment through an aperture provided on a center axis of the tip of the container main body, whereby it is mixed with the powder component. After the mixing, a through rod set within a nozzle provided on an extension line of the center axis of the cap is pushed in and breaks through the sheet of the pillow in the cap side, i.e., in the nozzle side, to form a

discharge outlet for the mixed material. Thereafter, the through rod is removed, a piston set in an interior of the rear end portion of the container main body is moved into the tip portion side of the container main body, and the mixed material in the mixing compartment is discharged through the nozzle.

[0006] The capsule for mixing and discharge having the structure as described above involves the following problems. That is, like the case of Japanese Patent Publication No. 38853/1991, since the sheet using a metal foil or the like wrapping the liquid component is squashed by force by means of a mechanical external pressure, thereby mixing the liquid component with the powder component in the mixing compartment, there is a risk that the liquid component dissolving an aluminum in broken section of the sheet therein mingles into the dental restoration material. Further, there may be a risk that a broken piece of the sheet mingles into the dental restoration material during the rupture of the pillow by a pushing pressure, the breakthrough of the pillow by the through rod, and the discharge of the mixed material. In addition, in such a structure, the pillow having a liquid component accommodated therein is located in a second cell between the tip portion of the mixing compartment and the nozzle. For this reason, in the case where the squash of the pillow is incomplete due to inexperience in the operation, or the like, there is a risk that the liquid component remains within the pillow, and the mixed material and the liquid component are extruded in a separated state at the tip or external surface of the mixed material during the discharge of the mixed material, whereby the desired performance is not likely obtained. Moreover, with respect to the operability, there is a defect that the operation is complicated because for the discharge of the mixed material, the through rod must be removed prior to the discharge, after the pillow is broken through by the through rod being pushed into the sheet having a higher strength of the pillow.

[0007] Further, like the case of Japanese Patent Laid-Open No. 268555/1987 as cited above, Japanese Patent Laid-Open No. 43653/1988 discloses a capsule for dental restoration material in which a liquid component pack having a liquid component packed by a sheet such as an aluminum foil is aligned in an outside of the tip of the mixing compartment of the container main body; the liquid component pack is ruptured by a screw-in pushing pressure of the cap, thereby making the liquid component flow into the mixing compartment through an aperture on the center axis of the container main body and mix with the powder component; and a plunger with a tool for breakthrough of a pack provided in the rear end portion of the container main body is moved to break through a tip of the liquid component pack in the nozzle side, thereby supplying a mixed dental restoration material into a dental restoration portion. However, in this capsule, like the above-described two structures, since the liquid component pack having the liquid component wrapped by a sheet such as an aluminum foil is used,

this capsule involves the following problems. That is, when the liquid component pack is pushed and ruptured, the liquid component in which the aluminum in the broken section of the sheet constituting the liquid component pack is dissolved likely mingles into the dental restoration material, and a broken piece of the liquid component pack likely mingles into the dental restoration material. Further, since the liquid component pack is located forward of the mixing compartment of the container main body, in the case where the pushing pressure is insufficient, the liquid component does not completely enter into the mixing compartment, whereby the mixing cannot be thoroughly effected. Besides, not only the liquid component remained within the liquid component pack is extruded in a separated form from the mixed material during the discharge of the mixed material, but also in a state before mixing the two components of the powder component and the liquid component, the aperture of the mixing compartment is clogged merely

5 by means that it has come into contact with a surface having a weak strength of the liquid component pack, whereby the powder component possibly leaks out.  
10  
15  
20  
25  
30  
35  
40  
45  
50  
55

#### SUMMARY OF THE INVENTION

[0008] The invention is aimed to overcome the problems of the conventional art capsules for dental restoration material as described above and provide a capsule for dental restoration material that is free from defects including dissolution of a broken metal section of a sheet constituting a pack accommodating a liquid component of the capsule for dental restoration material by the liquid component, contamination of a broken piece of the pack as a foreign matter into the dental restoration material by pushing rupture, and retention of the liquid component within the pack by insufficient pack pushing pressure, and that is improved in the sealing properties of a mixing compartment accommodating a powder component, is small-sized, is extremely simple in the structure, is less in the number of parts, and can be operated with ease.  
[0009] In order to solve the above-described problems of the conventional art, we, the present inventors made extensive and intensive investigations. As a result, it has been found that a capsule for dental restoration material for applying directly to a tooth site to be restored of a patient including a mixed material prepared by mixing therein a dental restoration material comprising two components of previously weighed constant amounts of a powder component and a liquid component, having a structure comprising a capsule main body in a cylindrical shape having a mixing compartment accommodating a powder component therein, the capsule main body being provided with a first aperture forming portion to form an outlet hole for the mixed material on a center axis in a tip portion thereof; a liquid cup having a liquid component accommodation compartment accommodating a liquid component therein, the liquid cup

being provided with a second aperture forming portion to form an outlet hole for the liquid component on a center axis in a tip portion thereof, being engaged with a cylindrical portion to form the mixing compartment of the capsule main body, and being provided on an external surface in the vicinity of a rear end portion thereof with a convex stopper having a size so as to inhibit the liquid cup to readily slide into the capsule main body during breaking through the second aperture forming portion to form the outlet hole for the liquid component but not inhibit the liquid cup to slide into the capsule main body when a large force is applied; a plunger having a rod-like projection for breaking through the second aperture forming portion of the liquid cup and the first aperture forming portion of the capsule main body, the plunger being engaged with a cylindrical portion within the liquid cup; and a nozzle whose rear end portion has a shape corresponding to the tip portion of the capsule main body, the nozzle being connected to the tip portion of the capsule main body, prevents a phenomenon that the liquid component dissolves a metal of a broken section of a pack, contamination of a broken piece of the pack into the dental restoration material, and retention of the liquid component within the pack, because the pack accommodating a liquid component is not used, improves the sealing properties of the mixing compartment accommodating the liquid component therein, is small-sized and simple in the structure, is less in the number of parts, and enables to perform the dental restoration remedy with an easy operation, leading to the accomplishment of the present invention.

[0010] And, it has been found that the following embodiments are preferred. That is, when an applier engagement groove is engraved on an outer periphery side surface in the vicinity of the rear end portion of the capsule main body, it is possible to easily perform an operation in which a claw of the applier is engaged with the applier engagement groove, and the plunger is moved by a push rod of the applier, thereby making the powder component flow completely into the mixing compartment and an operation in which the mixed material as prepared by mixing the liquid component and the powder component with each other is extruded from the nozzle. When the outlet hole of the first aperture forming portion of the capsule main body and the outlet hole of the second aperture forming portion of the liquid cup are a circular hole, respectively, and a notch having a size of about three-fourth of the circumference is provided in each periphery thereof, during breaking through the aperture forming portions of the capsule main body and the liquid cup by the rod-like projection of the plunger, the whole of the aperture forming portions can be broken through with a small force without causing cut-off. Further, when the tip portion of the nozzle is tapered and curved, the mixed material can be fed into a desired small site such as a tooth cavity, without forcing a patient to open a mouth largely. Still further, when the rear end portion of the nozzle is connected to the tip portion of

the capsule main body by means of an engagement of a ring-like convex portion with a ring-like concave portion having a corresponding shape thereto, the nozzle can be conveniently rotated against the capsule main body.

#### BRIEF DESCRIPTION OF THE DRAWINGS

##### [0011]

- Fig. 1 is a side cross-sectional view for explaining one embodiment of the capsule for dental restoration material according to the present invention; Fig. 2 is a side cross-sectional view for explaining a state of starting the mixing in the capsule for dental restoration material of Fig. 1; Fig. 3 is a side cross-sectional view to show an extrusion state of a mixed material in the capsule for dental restoration material of Fig. 1; and Fig. 4 is a cross-sectional view to show another embodiment of the capsule for dental restoration material according to the present invention.

#### DESCRIPTION OF THE PREFERRED EMBODIMENTS

- [0012] Embodiments of the capsule for dental restoration material according to the present invention will be described in detail with reference to the drawings.
- [0013] Fig. 1 is a side cross-sectional view for explaining one embodiment of the capsule for dental restoration material according to the present invention; Fig. 2 is a side cross-sectional view for explaining a state of starting the mixing in the capsule for dental restoration material of Fig. 1; Fig. 3 is a side cross-sectional view to show an extrusion state of a mixed material in the capsule for dental restoration material of Fig. 1; and Fig. 4 is a cross-sectional view to show another embodiment of the capsule for dental restoration material according to the present invention.
- [0014] In the drawings, a numeral 1 is a monolithically molded synthetic resin-made cylindrical capsule main body, in which a powder component A is previously accommodated and which is provided with a mixing compartment 1a for mixing the powder component A with a liquid component B when the liquid component B has flown thereto. The capsule main body 1 is also provided with a first aperture forming portion 1c to form an outlet hole 1b for a mixed material C comprising the powder component A and the liquid component B mixed with each other on a center axis in a tip portion 1d thereof. The capsule main body 1 has a shape corresponding to a nozzle 4 as described later on an external surface of the tip portion 1d, to which the nozzle 4 is connected. In this connection, it is preferred that an applier engagement groove 1f is engraved on an outer periphery side surface in the vicinity of a rear end portion of the capsule main body 1. Further, it is preferred that the capsule

main body 1 is constituted of a resin which will not impair the characteristics of the powder component A within the mixing compartment 1a.

[0015] A numeral 2 is a monolithically molded synthetic resin-made cylindrical liquid cup having a liquid component accommodation compartment 2a in which the liquid component B is accommodated. The liquid cup 2 is provided with a second aperture forming portion 2c to form an outlet hole 2b for the liquid component B on a center axis in a tip portion thereof, is engaged with a cylindrical portion for forming the mixing compartment 1a of the capsule main body 1, and is provided on an external surface in the vicinity of a rear end portion thereof with a convex stopper 2d having a size so as to inhibit the liquid cup 2 to readily slide into the capsule main body 1 during breaking through the second aperture forming portion 2c to form the circular hole 2b for the outlet of the liquid component B but not inhibit the liquid cup 2 to slide into the capsule main body 1 when a large force is applied. It is preferred that the liquid cup 2 is constituted of a resin which will not impair the characteristics of the liquid component B accommodated therein.

[0016] A numeral 3 is a plunger having a rod-like projection 3a for breaking through the second aperture forming portion 2c to form the outlet hole 2b of the liquid cup 2 and the first aperture forming portion 1c to form the outlet hole 1b of the capsule main body 1, which is engaged with a cylindrical portion within the liquid cup 2. It is preferred that the plunger 3 is constituted of a resin which will not impair the characteristics of the liquid component B accommodated in the liquid cup 2.

[0017] A numeral 4 is a nozzle, in which a rear end portion 4b thereof has a shape corresponding to the tip portion 1d of the capsule main body 1 such that the rear end portion 4b can be connected to the external surface of the tip portion 1d of the capsule main body 1. It is preferred that a tip portion 4a of the nozzle 4 is tapered and curved such that it is easy to apply the dental restoration material to a site to be restored of a patient.

[0018] Next, a method for use of the capsule for dental restoration material according to the present invention, which comprises the above-described constituting members, will be described below.

[0019] In the capsule for dental restoration material according to the present invention, the liquid cup 2 having a constant amount of the liquid component B accommodated in the liquid accommodation compartment 2a and sealed by the plunger 3 is engaged with an aperture in the rear end side of the capsule main body 1 having a constant amount of the powder component A accommodated in the mixing compartment 1a, and the rear end portion 4b of the nozzle 4 is connected to the external surface of the tip portion 1d of the capsule main body 1 (see Fig. 1).

[0020] In order to use the capsule for dental restoration material according to the present invention constituted as above, first of all, the plunger 3 engaged in the

rear end side of the liquid cup 2 that is engaged in the rear end side of the mixing compartment 1a of the capsule main body 1 is forced by a finger or the like until the tip of the plunger 3 has reached an internal surface of the tip portion of the liquid cup 2 and stopped. By this operation, the second aperture forming portion 2c on the center axis in the tip portion of the liquid component accommodation compartment 2a of the liquid cup 2 is broken by the rod-like projection 3a of the plunger 3, thereby the outlet hole 2b being opened, and the liquid component B is made flow completely into the mixing compartment 1a having the powder component A accommodated therein through the outlet hole 2b (see Fig. 2). During this period, since the convex stopper 2d is provided on the external side surface in the vicinity of the rear end portion of the liquid cup 2 and the convex stopper 2d is engaged with the rear end portion of the capsule main body 1, the liquid cup 2 does not enter into the capsule main body 1. In this connection, during

breaking through the second aperture forming portion 2c of the liquid cup 2 by the rod-like projection 3a of the plunger 3, when the outlet hole 2b is in a thin-film state or circular and a notch 2e having a size of approximately three-fourth of the circumference is provided, not only it can be easily broken through, but also cut-off of the whole from the liquid cup 2 can be prevented.

[0021] Thus, after the liquid component B has completely flown from the liquid component accommodation compartment 2a into the mixing compartment 1a, the capsule for dental restoration material according to the present invention is separately installed into an exclusive mixer, thereby mixing the powder component A and the liquid component B to form a mixed material C. When the mixing of the powder component A and the liquid component B are completed, a shoulder portion in the vicinity of the tip portion of the capsule main body 1 is engaged with an applier. Alternatively, in the case where the applier engagement groove 1f is engraved on the outer periphery side surface in the vicinity of the rear end portion of the capsule main body 1, a claw (not shown) of the applier is engaged with the applier engagement groove 1f. Then, the plunger integrated with the liquid cup 2 is moved to a tip direction within the capsule main body 1 by means of a push rod of the applier. By this operation, the first aperture forming portion 1c on the center axis in the tip portion of the capsule main body 1 is broken through by the rod-like projection 3a of the plunger 3 to open the outlet hole 1b, whereby the mixed material C flows into the nozzle 4 through the outlet hole 1b (see Fig. 3). In this connection, during breaking through the first aperture forming portion 1c of the capsule main body 1 by the rod-like projection 3a of the plunger 3, when the outlet hole 1b is in a thin-film state or circular and a notch 1e having a size of approximately three-fourth of the circumference is provided, not only it can be easily broken through, but also cut-off of the whole from the capsule main body 1 can be prevented.

[0022] In such a state, when the tip portion 4a of the

nozzle 4 is pushed to a tooth site to be restored of a patient, and the applier is operated, thereby the plunger 3 integrated with the liquid cup 2 being further moved to the tip direction within the capsule main body 1, the mixed material C is extruded from the tip portion 4a of the nozzle 4 and filled in the tooth site to be restored.

[0023] In the embodiment as shown in Figs. 1 to 3, the nozzle 4 has a shape in which the tip portion thereof is tapered and curved, has also a shape corresponding to the tip portion 1d of the capsule main body 1, and is connected to the tip portion 1d of the capsule main body 1 by means of weld fixing. In this case, the connection of the nozzle 4 to the capsule main body 1 is not particularly limited, but any of weld fixing by means of supersonic, laser, high frequency, or the like as in the above-described embodiment, adhesion fixing with an adhesive, and screw fixing by forming a screw portion can be employed as the fixing method.

[0024] Further, as shown in Fig. 4, when employing a method in which a ring-like convex portion is provided on an outer periphery of the tip portion 1d of the capsule main body 1, a ring-like concave portion having a shape corresponding thereto is provided in the rear end portion 4b of the nozzle 4, and the ring-like convex portion is engaged with the ring-like concave portion by means of an elasticity of the capsule main body 1 and/or the nozzle 4, thereby effecting the connection, the nozzle 4 is rotatable around the tip portion 1d of the capsule main body 1, so that the direction of the tip portion 4a of the nozzle 4 can be changed depending upon a site to apply, or the nozzle 4 can be removed from the capsule main body 1 and replaced by the other nozzles 4 suitable to use for various tooth sites to be restored of patients.

[0025] As such a modification of the structure, in Fig. 4, a ring-like convex portion may be provided on an outer periphery in the rear end portion 4b of the nozzle 4, whereas a ring-like concave portion having a shape corresponding to the outer periphery may be provided in the tip portion 1d of the capsule main body 1. Further, in Fig. 1, a ring-like convex portion may be provided on an outer periphery of the rear end portion 4b of the nozzle 4, whereas a ring-like concave portion having a shape corresponding to the inner periphery may be provided in the tip portion 1d of the capsule mainly body 1.

[0026] As described above in detail, since the capsule for dental restoration material according to the present invention does not use a liquid component pack in which an aluminum foil is used for accommodating a liquid component, as in the capsules as disclosed in Japanese Patent Publication No. 38853/1992, Japanese Patent Laid-Open No. 268555/1987, and Japanese Patent Laid-Open No. 43653/1988, it can not only prevent the liquid component having aluminum dissolved therein to mingle into the dental restoration material but also prevent a broken piece of the liquid component pack formed by pushing rupture to mingle into the dental restoration material. Further, the capsule for dental restoration material according to the present invention is free from a

risk that the liquid remains within the liquid component pack, whereby the mixed material and the liquid are discharged in a separated state from each other. Moreover, during use of the capsule for dental restoration material according to the present invention, the mixed material can be applied directly a tooth site to be restored, such as a cavity, by a simple operation comprising a step for forcing the plunger by a finger or the like, a step for mixing the powder component and the liquid component with each other by means of a mixer, and a step for extruding the mixed material after setting it in the applier. Still further, since the capsule for dental restoration material according to the present invention does not at all use a material that is likely dissolved in the liquid component, such as an aluminum, there is an advantage in the storage stability over a long period of time. Even further, in the capsule for dental restoration material according to the present invention, a nozzle can be replaced to the one having an optimum shape depending on the necessity in use for the dental restoration every time, by employing a method in which the rear end portion of the nozzle is connected to the tip portion of the capsule main body through an engagement of the ring-like convex portion with the concave portion having a shape corresponding to the inner periphery.

[0027] In addition, the capsule for dental restoration material according to the present invention has other various advantages as follows. That is, it requires neither an exclusive tool for pushing rupture of the liquid component pack nor an operation of pulling out the nozzle, as required in the capsule disclosed in Japanese Patent Publication No. 38853/1992; it is free from an operation of pushing rupture of the liquid component pack by twisting the cap, an operation of breaking through the liquid compartment pack by forcing the push rod installed within the nozzle, and an operation of drawing out the push rod before the discharge of the mixed material, as seen in the capsule disclosed in Japanese Patent Laid-Open No. 268555/1987; and it is free from an operation of pushing rupture of the liquid component pack by twisting the cap, as seen in the capsule disclosed in Japanese Patent Laid-Open No. 43653/1988.

[0028] Also, since the capsule for dental restoration material is of a disposable type, which is disposed after the remedy of each patient, the capsule for dental restoration material according to the present invention is less in the number of parts as compared with the conventional art capsules for dental restoration material, and hence, it can reduce the amount of wastes and contribute to environmental improvements.

[0029] In the light of the above, the capsule for dental restoration material according to the present invention, which has various advantages, is greatly valuable in contribution to the dental field.

[0030] While the present invention has been described in detail and with reference to specific embodiments thereof, it will be apparent to one skilled in the art that various changes and modifications can be made

therein without departing from the spirit and scope thereof.

**Claims**

1. A capsule for dental restoration material for applying directly to a tooth site to be restored of a patient including a mixed material prepared by mixing therein a dental restoration material comprising two components of previously weighed constant amounts of a powder component and a liquid component, having a structure comprising:

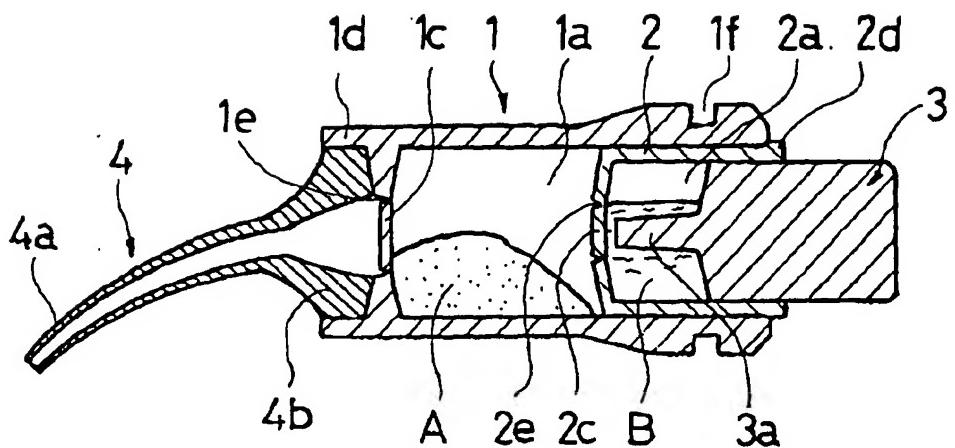
a capsule main body (1) in a cylindrical shape having a mixing compartment (1a) accommodating a powder component (A) therein, the capsule main body (1) being provided with a first aperture forming portion (1c) to form an outlet hole (1b) for the mixed material (C) on a center axis in a tip portion (1d) thereof; 15  
 a liquid cup (2) having a liquid component accommodation compartment (2a) accommodating a liquid component (B) therein, the liquid cup (2) being provided with a second aperture forming portion (2c) to form an outlet hole (2b) for the liquid component (B) on a center axis in a tip portion thereof, being engaged with a cylindrical portion to form the mixing compartment (1a) of the capsule main body (1), and being provided on an external surface in the vicinity of a rear end portion thereof with a convex stopper (2d) having a size so as to inhibit the liquid cup (2) to readily slide into the capsule main body (1) during breaking through the second aperture forming portion (2c) to form the outlet hole (2b) for the liquid component (B) but not inhibit the liquid cup (2) to slide into the capsule main body when a large force is applied; 20  
 a plunger (3) having a rod-like projection (3a) for breaking through the second aperture forming portion (2c) of the liquid cup (2) and the first aperture forming portion (1c) of the capsule main body (1), the plunger (3) being engaged with a cylindrical portion within the liquid cup (2); and 25  
 a nozzle (4) whose rear end portion (4b) has a shape corresponding to the tip portion (1d) of the capsule main body (1), the nozzle (4) being connected to the tip portion (1d) of the capsule main body (1). 30

2. A capsule for dental restoration material as claimed in claim 1, wherein an applier engagement groove is engraved on an outer periphery side surface in the vicinity of the rear end portion of the capsule main body. 50

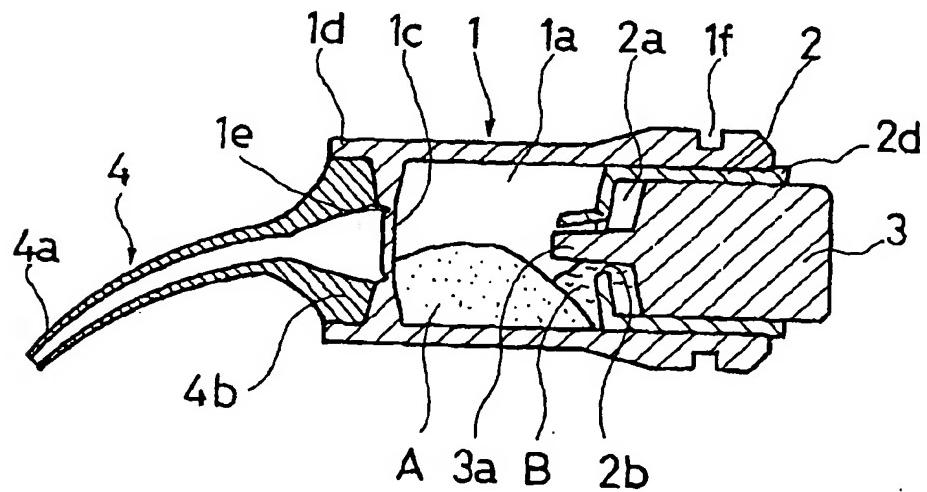
3. A capsule for dental restoration material as claimed in claim 1 or 2, wherein the outlet hole (1b) of the first aperture forming portion (1c) of the capsule main body (1) and the outlet hole (2b) of the second aperture forming portion (2c) of the liquid cup (2) are a circular hole, respectively, and a notch having a size of about three-fourth of the circumference is provided in each periphery thereof.

- 10 4. A capsule for dental restoration material as claimed in any one of claims 1 to 3, wherein the tip portion (4a) of the nozzle (4) is tapered and curved.
5. A capsule for dental restoration material as claimed in any one of claims 1 to 4, wherein the rear end portion (4b) of the nozzle (4) is connected to the tip portion (1d) of the capsule main body (1) by means of an engagement of a ring-like convex portion with a ring-like concave portion having a corresponding shape thereto. 55

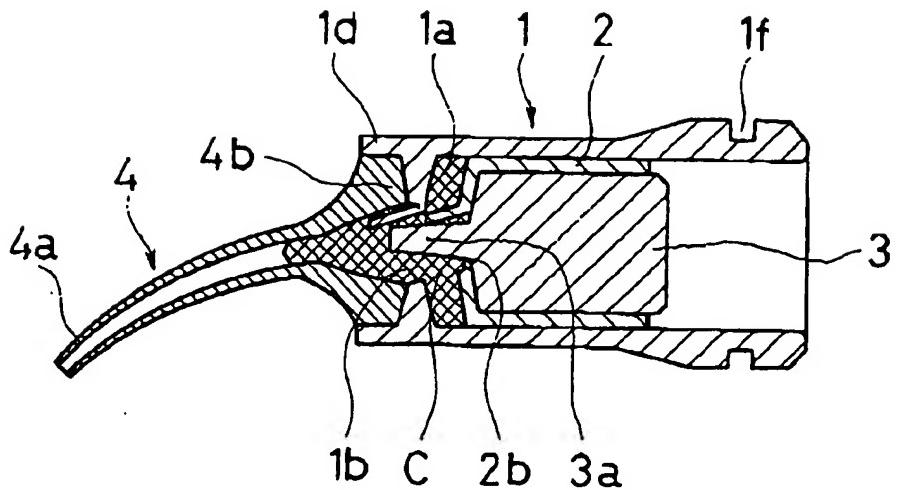
【Fig. 1】



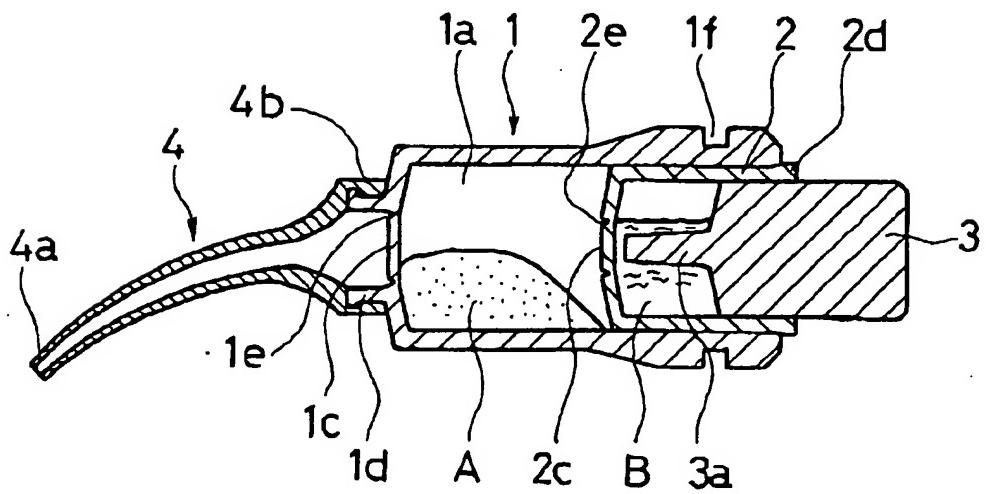
【Fig. 2】



【Fig. 3】



【Fig. 4】





European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number  
EP 01 10 0219

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 09, 30 September 1996 (1996-09-30) & JP 08 131459 A (G C:KK), 28 May 1996 (1996-05-28) * abstract *---	1,2,4,5	A61C5/06
X	US 5 172 807 A (DRAGAN WILLIAM B ET AL) 22 December 1992 (1992-12-22) * column 1, line 55 - column 2, line 35; figures 2A,,2B,,8 * * column 2, line 57 - column 3, line 37 * * column 4, line 4 - column 4, line 8 * * column 4, line 50 - column 4, line 56 * * column 5, line 6 - column 5, line 65 *---	1-3	
X	US 3 731 853 A (BAUMANN E ET AL) 8 May 1973 (1973-05-08) * column 1, line 21 - column 1, line 34; figures * * column 2, line 25 - column 2, line 68 * * column 3, line 39 - column 3, line 65 * * column 5, line 60 - column 5, line 63 *---	1,3-5	TECHNICAL FIELDS SEARCHED (Int.Cl.)
X	DE 20 60 626 A (ETABLISSEMENT DENTAIRE IVOCLAR) 22 June 1972 (1972-06-22) * the whole document *-----	1,3	A61C B65D
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
MUNICH	21 June 2001	Fouquet, M	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone			
Y : particularly relevant if combined with another document of the same category			
A : technological background			
O : non-written disclosure			
P : intermediate document			

**ANNEX TO THE EUROPEAN SEARCH REPORT  
ON EUROPEAN PATENT APPLICATION NO.**

EP 01 10 0219

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.  
The members are as contained in the European Patent Office EDP file on  
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

21-06-2001

Patent document cited in search report		Publication date	Patent family member(s)		Publication date
JP 08131459 A		28-05-1996	NONE		
US 5172807	A	22-12-1992	DE	4232062 A	01-04-1993
			GB	2259901 A, B	31-03-1993
			JP	5192381 A	03-08-1993
US 3731853 A		08-05-1973	DE	1939315 A	18-02-1971
			CA	959456 A	17-12-1974
			CH	511598 A	31-08-1971
			FR	2057819 A	21-05-1971
			GB	1315187 A	26-04-1973
			NL	7011332 A	03-02-1971
			SE	360975 B	15-10-1973
DE 2060626 A		22-06-1972	DE	1939316 A	04-02-1971
			CH	556270 A	29-11-1974
			NL	7116750 A	13-06-1972
			SE	365709 B	01-04-1974
			AT	318132 B	25-09-1974
			CA	959457 A	17-12-1974
			CH	537841 A	15-06-1973
			FR	2057820 A	21-05-1971
			GB	1314234 A	18-04-1973
			NL	7011331 A	03-02-1971
			SE	360974 B	15-10-1973
			US	3739947 A	19-06-1973